

Joseph P. Gonzalez
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EDUCATION

Syracuse University, Syracuse, NY, **Department:** Earth Science
Doctor of Philosophy, Earth Sciences, December 2019
Committee: Professor Suzanne Baldwin (Primary Advisor) (Syracuse University),
Professor Jay Thomas (Syracuse University), Professor Paul Fitzgerald (Syracuse
University), Professor Laura Webb (University of Vermont), Dr. Jonathan Kim (Vermont
State Geological Survey)
Dissertation: Applications of elastic modeling, thermobarometry, and thermal history
modeling to ultrahigh-pressure metamorphic rocks

University of Wyoming, Laramie, WY **Departments:** Geology, ENR
Bachelor of Science, Geology, May 2015
Bachelor of Science, Environment and Natural Resources, May 2015
Advisors: Professor Carol Frost, Professor B.R. Frost, Professor Susan Swapp

FELLOWSHIPS

NSF EAR Postdoctoral Fellow (Jan 2021- Present: *through Jan 2023*)
ERC True Depths Postdoctoral Fellow (Feb 2020-Jan 2021)
Syracuse University Summer Dissertation Fellowship (May 2019-Aug 2019)
Syracuse University STEM Fellow (Aug 2018-Dec 2019)
Syracuse University McNair Fellow (Aug 2017-May 2018)
University of Wyoming McNair Scholar (Nov 2014-May 2015)
University of Wyoming EPSCoR Fellow (Jan 2014-May 2015)

POSITIONS/RESEARCH EXPERIENCE

National Science Foundation EAR Postdoctoral Fellow, Feb 2020-Present
Università degli studi di Pavia, Pavia, Italy
Mentor: Professor Matteo Alvaro, Dipartimento di scienza della terra e dell'ambiente

True Depths Postdoctoral Fellow, Feb 2020-Jan 2021
Università degli studi di Pavia, Pavia, Italy
Mentor: Professor Matteo Alvaro, Dipartimento della scienza della terra e dell'ambiente

Objective: Develop, verify, and apply an elastic model for anisotropic quartz inclusions
in zircon hosts to determine the pressure-temperature conditions of zircon crystallization.

- Numerical modeling of host-inclusion deformational and elastic interactions
- Experimental synthesis of anisotropic zircon-in-quartz host inclusion pairs
- Raman spectroscopic characterization and measurement of zircon inclusions in quartz for calculation of entrapment conditions

PhD Candidate,

August 2015-Present

Syracuse University, Syracuse, NY

Advisor: Professor Suzanne Baldwin, Department of Earth Sciences

Objective: Determine the subduction and exhumation metamorphic conditions of Taconic orogen high-pressure rocks in the Tillotson Peak Complex, northern Vermont, to improve understanding of the crustal dynamics in polymetamorphosed orogens.

- Collection of oriented samples with structural data and documentation of field relationships between lithologies
- Petrographic characterization of metamorphic fabrics, mineralogy, and microstructures
- Raman spectroscopic characterization and measurement of quartz inclusions in garnet for elastic thermobarometry
- Processing of electron microprobe X-ray maps and spot analyses in MATLAB using XMapTools (Lanari et al., 2014) for White Mica-Quartz-H₂O thermobarometry, chlorite thermometry, and Si in white mica thermobarometry
- Equilibrium phase diagram modeling in Theriak-Domino
- White mica and glaucophane total fusion ⁴⁰Ar/³⁹Ar geochronology

Objective: Integrate elastic thermobarometry and trace element thermobarometry from mineral inclusions to resolve P-T conditions during exhumation of the quartzofeldspathic gneiss that contains the world's youngest eclogites.

- Detailed petrographic characterization of samples.
- Raman spectroscopy of quartz inclusions in garnet for elastic thermobarometry
- Elastic modeling of >200 individual quartz inclusions
- Used electron microprobe wavelength dispersive spectroscopy for trace element thermobarometry and X-ray mapping of garnets for characterization of geochemical patterns

Objective: Model continuous pressure-temperature-time paths using ⁴⁰Ar/³⁹Ar inverse thermal history modeling and integration with thermobarometry.

- Inverse thermal history modeling of ⁴⁰Ar/³⁹Ar data from phengites
- Processing of X-ray maps using XMapTools for White Mica-Quartz-H₂O and Si-in-phengite thermobarometry

Microbeam Laboratory Assistant, University of Wyoming

Aug 2014-May 2015

Supervisor: Professor Susan Swapp, Department of Geology and Geophysics, Senior Research Scientist

- Sample preparation for scanning electron microscope, electron microprobe, X-ray fluorescence, and X-ray diffraction
- Separated pyrite for study focused on determining the geochemical history and movement of a uranium roll front deposit in central Wyoming
- Preparation of sediment cores taken from three different locations within the uranium roll front of central Wyoming
- Preparation of petrographic thin sections

McNair Fellow, University of Wyoming

May 2014-Oct 2014

Supervisor: Professor Carol Frost, Department of Geology and Geophysics,

Objective: Use geologic mapping and petrographic characterization to characterize and describe the emplacement mechanism of the 1.43 Ga ferroan Sherman batholith in southeastern Wyoming and northern Colorado

- Geologic mapping of the Sherman batholith at two different locations along the Colorado-Wyoming state boundary
- Preparation petrographic thin sections and characterization of petrologic relationships at the margin of Sherman batholith
- Mapped and plotted the location of Sherman batholith outcrops subsequent plutonic rocks
- Describe influence of country rock rheology on assimilation in the Sherman granite

EPSCoR Fellow, University of Wyoming

Jan 2014-May 2014

Supervisor: Professor B.R. Frost, Department of Geology and Geophysics

Objective: Use geochemical characterization and zircon characterization to investigate the origin of Archean orthogneisses and quartzites at Black Rock Mountain, central Wyoming

- Petrographic characterization of samples using thin sections
- X-ray fluorescence for major and trace element composition of samples
- X-ray diffraction to determine the crystalline structure of orthogneiss minerals
- Major and trace element discrimination diagrams to determine the geochemical similarity of the orthogneisses to other Archean rocks from Tin Cup Mountain
- Cathodoluminescence imaging on the scanning electron microscope of zircons separated from orthogneisses

PUBLICATIONS

Google Scholar Profile:

<https://scholar.google.com/citations?user=dTEnXxMAAAAJ&hl=en>

Gonzalez, J.P., Mazzucchelli, M.L., Angel, R.J., Alvaro, M., (in preparation) Elastic geobarometry for anisotropic host-inclusion systems: Quartz-in-zircon.

- Gonzalez, J.P.**, Thomas, J.B., Mazzucchelli, M.L., Murri, M., Osborne, Z.R., Angel, R.J., Alvaro, M., (in preparation) Experimental synthesis of zircon in quartz host inclusion pairs: Evaluation of anisotropic host-inclusion elastic thermobarometry.
- Gonzalez, J.P.**, Baldwin, S.L., Thomas, J.B., Lanari, P., Nachlas, W.O., Fitzgerald, P.G., (in preparation) Petrologic constraints on the subduction-exhumation history of ultrahigh- and high-pressure rocks in the Tillotson Peak Complex of the north-central Appalachian Orogen.
- Baldwin, S.L., Schöning, J., **Gonzalez, J.P.**, Davies, H., Enyantten, H., 2021, Garnet sand reveals transit through the rock cycle in active plate boundary zones: Proceedings of the National Academy of Sciences of the United States of America, v. 118, p. 1-8, doi: 10.1073/pnas.2017231118.
- Gonzalez, J.P.**, Baldwin, S.L., Thomas, J.B., Nachlas, W.O., and Fitzgerald, P.G., 2020, Evidence for ultrahigh-pressure metamorphism discovered in the Appalachian orogen: *Geology*, v. 48, p. 947–951, doi:10.1130/G47507.1/5074186/g47507.pdf.
- Gonzalez, J.P.**, Thomas, J.B., Baldwin, S.L., and Alvaro, M., 2019, Quartz-in-garnet and Ti-in-quartz thermobarometry: Methodology and first application to a quartzofeldspathic gneiss from eastern Papua New Guinea: *Journal of Metamorphic Geology*, v. 37, p. 1193–1208, doi:10.1111/jmg.12508.
- Gonzalez, J.P.**, and Baldwin, S.L., 2019, Modelling white mica pressure-temperature-time (P-T-t) paths using thermobarometric and $^{40}\text{Ar}/^{39}\text{Ar}$ thermochronologic data: *Terra Nova*, v. 31, p. 169–178, doi:10.1111/ter.12381.
- Frost, C.D., McLaughlin, J.F., Frost, B.R., Fanning, C.M., Swapp, S.M., Kruckenberg, S.C., and **Gonzalez, J.**, 2017, Hadean origins of paleoarchean continental crust in the central Wyoming province: *Bulletin of the Geological Society of America*, v. 129, p. 259–280, doi:10.1130/B31555.1.

INVITED PRESENTATIONS

Gonzalez, J.P., Baldwin, S.L., Thomas, J.B., Nachlas, W.O., Fitzgerald, P.G., Lanari, P. (2021) Petrologic constraints on subduction zone metamorphism from a coesite-bearing metapelite in the Northern Appalachian Orogen. EGU Meeting. Session TS7.11 “The Caledonian orogen of the North Atlantic region: a natural laboratory for studying tectonic processes”.

CONFERENCE ABSTRACTS

Gonzalez, J.P., Baldwin, S.L., Thomas, J.B., Nachlas, W.O., Fitzgerald, P.G. (2019) First Discovery of Coesite in the Appalachians: Characterization of Prograde Metamorphism in a Taconic Metapelite. AGU Fall Meeting. **Oral Presentation.**

Gonzalez, J.P., Baldwin, S.L., Thomas, J.B., Fitzgerald, P.G., Webb, L.E., Kim, J.J. (2018) Peak pressure-temperature-time estimates for Taconic orogen high-pressure rocks, Tillotson Peak Complex, Vermont. AGU Fall Meeting. **Oral Presentation.**

Gonzalez, J.P., Baldwin, S.L., Thomas, J.B. (2018) Pressure-temperature determinations from integrated elastic and trace element thermobarometry: A case study from the (U)HP terrane of Papua New Guinea. GSA Annual Meeting. **Poster Presentation.**

Gonzalez, J.P. (2018) Application of petrochronologic methods to (ultra)high-pressure metamorphic rocks. Universität Bern. **Oral Presentation.**

Gonzalez, J.P. (2018) A comparison of pressure-temperature-time (P-T-t) histories across the Burgess Branch Fault Zone, northern Vermont. Northeast GSA Annual Meeting. **Oral Presentation.**

Gonzalez, J.P. (2018) Constraining garnet pressure conditions in the youngest known (ultra)high-pressure terrane on Earth, Papua New Guinea. CNYESSS. **Poster Presentation.**

Gonzalez, J.P. (2018) Pressure-temperature-time histories across the Burgess Branch Fault Zone, northern Vermont. CNYAPG, Invited Presentation. **Oral Presentation.**

Gonzalez, J.P., Baldwin, S.L. (2017) Re-evaluation of phengite petrologic data and $^{40}\text{Ar}/^{39}\text{Ar}$ age spectra to determine pressure-temperature-time paths. GSA Annual Meeting. **Oral Presentation.**

Gonzalez, J.P., Baldwin, S.L. (2016) Petrologic characterization of high-pressure metamorphic rocks along the Burgess Branch Fault Zone at the Tillotson Peak Complex, Vermont. GSA Posters with Abstracts. **Poster Presentation.**

Gonzalez, J.P., Baldwin, S.L. (2015). Thermochronologic analysis of the Burgess Branch Fault Zone at the Tillotson Peak Complex, Vermont. CNYESSS. **Poster Presentation.**

Gonzalez, J.P., Frost, C.D., Bagdonas, D.A. (2015). Contact relations along the southern margin of the Sherman batholith. University of Wyoming, Undergraduate Research Day. **Poster Presentation.**

Gonzalez, J.P., Frost, C.D., Bagdonas, D.A. (2015). Contact relations along the southern margin of the Sherman batholith. University of Wyoming, McNair National Symposium. **Oral Presentation.**

Gonzalez, J.P., Frost, C.D., Bagdonas, D.A. (2015). Contact relations along the southern margin of the Sherman batholith. University of Wyoming, McNair Research Symposium. **Oral Presentation.**

Gonzalez, J.P., Frost, B.R., Frost, C.D., Swapp, S.W. (2014). Characterization of granitic gneisses at Black Rock Mountain, Wyoming. University of Wyoming, Undergraduate Research Day. **Poster Presentation.**

TEACHING EXPERIENCE

Teaching Assistant, Syracuse University Aug 2015-May 2017

Earth Science 314 (Mineralogy): Teach one laboratory section (Jan 2017-Present)

- Instruct laboratories, preparation of laboratories including making lectures, hold student meetings for assistance, grade laboratories, assist instructor

Earth Science 318/618 (Petrology): Teach one laboratory section (Aug 2016-Dec 2016)

- Instruct laboratories, preparation of laboratories including making lectures, quizzes, and tests, hold student meetings for assistance, grade laboratories, assist instructor

Earth Science 110 (Dynamic Earth): Teach one laboratory section (May 2016-July 2016)

- Instruct laboratories, preparation of laboratories including making lectures, hold student meetings for assistance, grade laboratories, assist instructor

Earth Science 106 (Geohazards): Teach three recitation sections (Jan 2016-May 2016)

- Instruct recitation sections, assist with the preparation of recitation materials, and grade recitation assignments

Earth Science 105 (Earth Science): Teach three recitation sections (Aug 2015-Dec 2015)

- Instruct recitation sections, assist with the preparation of recitation materials, and grade recitation assignments

LABORATORY SKILLS/TECHNICAL PROFICIENCY

Raman spectroscopy, piston-cylinder apparatus, electron microprobe (energy dispersive spectroscopy, wavelength dispersive spectroscopy, backscatter electron imaging, secondary electron imaging), $^{40}\text{Ar}/^{39}\text{Ar}$ method, mineral separation, X-ray fluorescence, X-ray diffraction, scanning electron microscope, transmitted light petrography, reflected light petrography, geologic mapping, preparation of thin sections/thick sections, geochemical preparation

COMPUTER SKILLS

Renishaw WiRE, XMapTools, MATLAB, Abaqus, Adobe Suite, LabVIEW, ArcGIS, @Risk, Microsoft Office

AWARDS AND HONORS

Department of Earth Sciences Student Publication Award (May 2019)

Syracuse University Teaching Assistantship (Aug 2015-May 2017)

University of Wyoming Field Camp Scholarship (May 2015)
Cardinal Key National Honorary (Jan 2013-May 2015)
Balanced Man Scholarship (Aug 2010)
Rocky Mountain Scholarship (Aug 2010-May 2015)

GRANTS

K.D. Nelson Research Grant (April 2019, April 2018, April 2017, April 2016)
Geological Society of America Graduate Student Research Grant (April 2017, 2016)
CNYAPG Scholarship for Graduate Student Research (Jan 2017)
Geological Society of America Travel Grant (Sept 2016, 2018)
Graduate Student Organization Travel Grant (Sept 2016)
J. Prucha Research Grant (April 2016)

WORKSHOPS

Introduction to XMapTools. Syracuse University. (Aug 2018) *organized Dr. Pierre Lanari's visit.*
Petrochronology Methods and Applications. GSA Annual Meeting Workshop. (Oct 2017) *merit stipend awarded*
University of California, Los Angeles, Secondary ionization mass spectrometry. NSF funded workshop (Feb 2017) *merit stipend awarded*

MEMBERSHIPS

American Geophysical Union
American Association of Petroleum Geologists
European Geophysical Union
Geological Society of America, Volcanology, Mineralogy, and Petrology Division, Structural Geology and Tectonics Division
Mineralogical Society of America

LANGUAGES

Italian

- Written – Conversational
- Spoken – Conversational

REFERENCES

Associate Professor Matteo Alvaro
Università degli studi di Pavia
Dipartimento di Scienza della terra e dell'ambiente
Via Adolfo Ferrata, 7, 27100 Pavia PV, Italy
email: matteo.alvaro@unipv.it

Professor Suzanne Baldwin
Michael G. and Susan T. Thonis Professor of Earth Sciences
Syracuse University
Department of Earth Sciences
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